

What is claimed is:

1. A semiconductor device comprising:

a MOS field-effect transistor; and

a diode which is built in said transistor and  
5 connected between a source electrode and a drain electrode  
thereof so that when a voltage in the reverse direction is  
applied between said source electrode and said drain  
electrode at the time of operation , which forms a current  
path between said source electrode and drain electrode,

10 wherein a contact portion of said diode with said  
source electrode has such a construction that a high-  
impurity concentration region having a second conductivity  
type which is a conductivity type of said source electrode  
side semiconductor layer of said diode, and a region having  
15 a first conductivity type opposite to said conductivity type  
or a low-impurity concentration region having said second  
conductivity type are formed alternately in a plan  
structure.

2. The semiconductor device of claim 1, wherein said  
20 MOS field-effect transistor is a double-diffusion type MOS  
field-effect transistor that has a first conductivity type  
semiconductor layer which provides a drain region, second  
conductivity type regions which are formed by diffusion in  
said first conductivity type semiconductor layer, and source  
25 regions having a first conductivity type formed by diffusion  
at an outer periphery of each of said second conductivity  
type regions in such a configuration that such portions of

said second conductivity type regions which are positioned between each of said source regions and said drain region act as channel regions.

3. The semiconductor device of claim 2, wherein said  
5 source electrode is provided so as to be in contact with each of said source regions and a surface portion of each of said second conductivity type regions opposite to each of said channel regions with respect to each of said source regions.

4. The semiconductor device of claim 3, wherein said  
10 second conductivity type regions are formed in a matrix in said first conductivity type semiconductor layer, each of said source regions is formed in a ring shape on a plan view in each of said second conductivity type regions so as to give a constant gap at the periphery of each of said second  
15 conductivity type regions, and also said source electrode is formed at a predetermined region of an inner circumference of each of said ring-shaped source regions and the entire inner surface of each of said second conductivity type regions.

20 5. The semiconductor device of claim 4, wherein a contact portion of each of said second conductivity type regions with said source electrode has such a construction that one or more first conductivity type high impurity-concentration regions, each of which is ring shape on a plan  
25 view and one or more second conductivity type high impurity-concentration regions are provided alternately.

6. The semiconductor device of claim 4, wherein each

of said second conductivity type regions has a low impurity concentration; and wherein a contact portion of each of said second conductivity type regions with said source electrode has such a construction that second conductivity type high  
5 impurity-concentration regions are evenly spaced in each of said second conductivity type regions.

10030089 014401